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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/537,315	08/22/2005	Poopathy Kathirgamanathan	LUC-012	8381

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04/16/2008

EXAMINER
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NELSON, MICHAEL E

ART UNIT	PAPER NUMBER
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1794

MAIL DATE	DELIVERY MODE
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04/16/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/537,315	<b>Applicant(s)</b> KATHIRGAMANATHAN ET AL.	
	<b>Examiner</b> MICHAEL E. NELSON	<b>Art Unit</b> 1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 02 June 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 24-49 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 24-49 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 June 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Information Disclosure Statement***

The listing of references in the Search Report is not considered to be an information disclosure statement (IDS) complying with 37 CFR 1.98. 37 CFR 1.98(a)(2) requires a legible copy of: (1) each foreign patent; (2) each publication or that portion which caused it to be listed; (3) for each cited pending U.S. application, the application specification including claims, and any drawing of the application, or that portion of the application which caused it to be listed including any claims directed to that portion, unless the cited pending U.S. application is stored in the Image File Wrapper (IFW) system; and (4) all other information, or that portion which caused it to be listed. In addition, each IDS must include a list of all patents, publications, applications, or other information submitted for consideration by the Office (see 37 CFR 1.98(a)(1) and (b)), and MPEP § 609.04(a), subsection I. states, "the list ... must be submitted on a separate paper." Therefore, the references cited in the Search Report have not been considered. Applicant is advised that the date of submission of any item of information or any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the IDS, including all "statement" requirements of 37 CFR 1.97(e). See MPEP § 609.05(a).

### ***Specification***

1. The disclosure is objected to because of the following informalities:

2. At the beginning of page 2, the specification states, "We have now invented electroluminescent materials which do not include a rare earth, transition metal, lanthanide or an actinide." However, in the next paragraph the structural formula states only that the metal is not aluminum, and on page 6, disclose that preferred metals include indium, lead, and the first, second, and third groups of the **transition metals** and 4 of the specific examples are rare earth metals. The specification should be consistent in it's teaching.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

3. Claim 25, 27-28, 30, 32-33, 36, 38, 47-49 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Concerning claims 27 and 33 describe the group L<sub>p</sub> However, at the end of page 4 (or 8) of the amended claims, "amino groups having any of the following general chemical formulas" appears to define the following formulas as within the definition of Ph, but is unclear, if not impossible. According to the specification (page 4), the "groups having any of the following general formulas" should be separated from the definitions of Ph to indicate a new set of group L<sub>p</sub>.

5. Regarding claims 28 and 32, the phrase "for example (e.g.)" renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

6. A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. See MPEP § 2173.05(c). Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claims 25 and 30 recite the broad recitation "metals of the first, second, and third groups of transition metals", and the claim also recites specific metals which are within the first, second and third groups, which is the narrower statement of the range/limitation.

7. Concerning claims 36 and 38, both claims recite the limitations where "the hole transmitting material is a film of a **polymer** selected from the group consisting of," but lists non-polymeric materials (TPD) in the list. It is unclear whether the claim is limited to polymeric materials or not.

8. Claim 47 recites the limitation the device according to claim 34, wherein the hole transmitting material and the electroluminescent compound are mixed to form one layer. There is insufficient antecedent basis for this limitation in the claim. Claim 34, from

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which this claim depends, clearly states that the hole transmitting material and luminescent material should be in separate layers.

9. Claim 48 recites the limitation the device according to claim 39, wherein the electron transmitting material and the electroluminescent compound are mixed to form one layer. There is insufficient antecedent basis for this limitation in the claim. Claim 39, from which this claim depends, clearly states that the electron transmitting material and luminescent material should be in separate layers.

10. Claim 49 is rejected as being dependent from claim 48.

### ***Claim Rejections - 35 USC § 102***

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

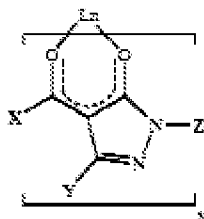
(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

12. Claims 24, 29, 34-36, 39-41, and 45 are rejected under 35 U.S.C. 102(b) as being anticipated by Pillow et al. (WO 2002/20692).

13. Concerning claim 24, Pillow et al. disclose electroluminescent compounds having the general formula shown below, where Ln is a lanthanide metal, X, Y and Z are

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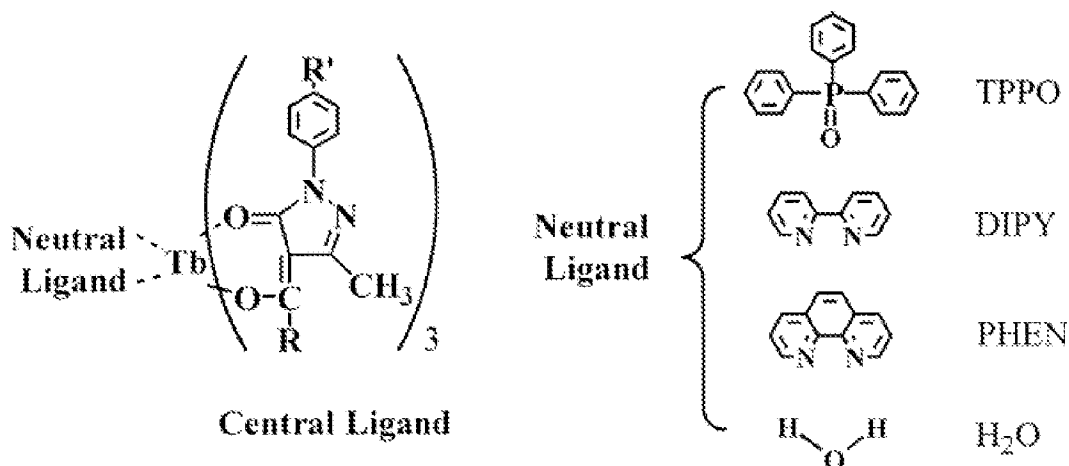
hydrogen, optionally substituted aromatic, or optionally substituted aliphatic or cycloaliphatic (page 2, lines 4-14).



14. Concerning claims 29, 34-36, 39-41, and 45, Pillow et al. describe organic electroluminescent devices comprising the compound shown above. The devices consist of a first electrode (of ITO), a hole transmitting layer between the first electrode and the light emitting layer comprising the electroluminescent complex (per claim 34), comprising a hole transmitting material (specifically  $\alpha$ -NPD or TPD (aromatic amine complexes (per claim 35 and 36), or PEDOT (conjugated polymer, per claim 35, substituted polythiophene, per claim 36). (page 8, lines 13-14) The device further includes an electron transmitting layer between the electroluminescent compound layer and the second electrode (per claim 39), where the electron transmitting material is Alq<sub>3</sub> (metal quinolate, aluminum quinolate, per claim 40 and 41), and finally a cathode (second electrode) of aluminum (per claim 45). (See table page 16, entries L-N)

15. Claims 26-27, 31, 33, 37-38, 42-44, and 46 are rejected under 35 U.S.C. 102(b) as being anticipated by Gao et al. (Synthetic Metals, vol. 99, no. 2, pp 127-132, 1999).

16. Concerning claims 26-27, Gao et al. describe materials having the structure shown below.



17. Concerning claims 31, 33, 37-38, 42-44, and 46, Gao et al. describe organic electroluminescent devices using the materials shown above (per claims 31 and 33). The device comprises an anode (first electrode) of ITO, and a light emitting layer consisting essentially of the material discussed above (pages 130-131, Figure 4). The device further includes a hole transport layer between the first electrode and light emitting layer of TPD (aromatic amine complex, per claims 37 and 38) and an electron transporting layer between the luminescent layer and the second electrode (per claim 42), where the electron transport material is ALQ (same as Alq<sub>3</sub>), aluminum quinolate (per claim 43), which is a metal quinolate (per claim 44), and a second electrode of Aluminum (per claim 46).

18. Claims 24-25 are rejected under 35 U.S.C. 102(b) as being anticipated by Akama et al., Vol. 44, pp. 1101-1112 (1995).



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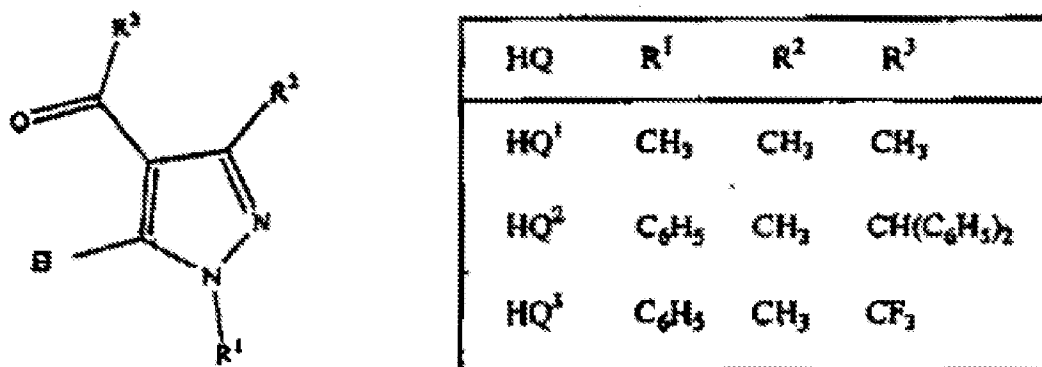
19. Regarding the preamble recitation in claim 24 of “electroluminescent”, all compounds of formula (I) as defined in claim 24 are presumed by the examiner to be capable of exhibiting electroluminescence absent objective evidence to the contrary.

20. Akama et al. disclose the metal complexes  $M(\text{PMBP})_3$  wherein M is Ga, In, Cr, Fe, and PMBP is 1-phenyl-3-methyl-4-benzoyl-5-pyrazolone. Accordingly, the prior art complexes in which M is Ga, In, Cr or Fe anticipate a compound of formula (I) as defined in present claim 24 in which  $R_1$  is a methyl group (a methyl group being both a hydrocarbyl group and an aliphatic group), and each of  $R_2$  and  $R_3$  is a phenyl group (a phenyl group being both a hydrocarbyl group and an unsubstituted aromatic group).

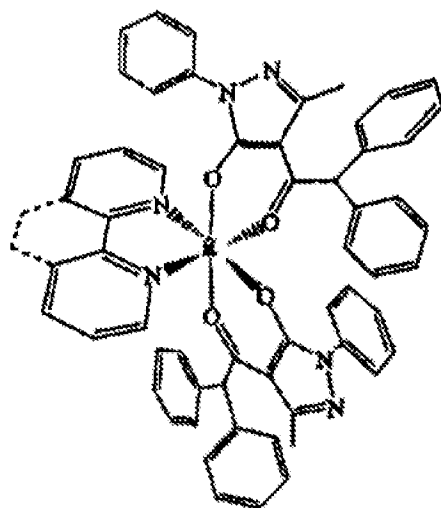
21. Claims 26-28 are rejected under 35 U.S.C. 102(b) as being anticipated by Marchetti (Main Group Metal Chemistry, vol. 24, no. 5, pp. 257-266, 2001).

22. Regarding the preamble recitation in claim 24 of “electroluminescent”, all compounds of formula (I) as defined in claim 24 are presumed by the examiner to be capable of exhibiting electroluminescence absent objective evidence to the contrary.

23. Marchetti et al. describe complexes of Zinc and Cadmium with a pyrazolonate ligand shown below coordinated to ancillary ligands, specifically phenanthroline or 2,2'-bipyridyl, giving compounds having the structures shown below, where the central atom is Zn or Cd (pages 257-260).



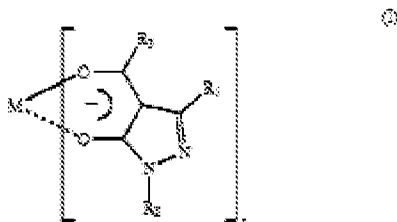
**Fig. 1. Proligands HQ used in this work.**



24. Claims 24-25, 29-30, 34-36, 39-41, 45, 47-49 are rejected under 35 U.S.C. 102(e) as being anticipated by Kathirgamanathan et al. (7,211,334).

25. Concerning claims 24-25, Kathirgamanathan et al. (7,211,334) describes materials having the general structure shown below, where M is any non-rare earth metal, such as , rubidium, calcium copper, zinc, gallium, indium, tin, ruthenium, osmium, cobalt, et. (column 2, lines 58-65)

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26. Concerning claims 29-30, 34-36, 39-41, 45, 47-49 Kathirgamanathan et al. describe organic electroluminescent devices comprising the material described above. The devices have a first electrode (of ITO), and a light emitting layer comprising the material shown above, and a second electrode of Al (per claim 45). (see examples 9-11, column 15). The device further includes a hole transporting material of  $\alpha$ -NPB (aromatic amine complex, per claim 35) between the first electrode and luminescent layer (per claim 34), but also include TPC, polyanilines, polythiophenes, etc. (per claim 36). (column 3, lines 29-36) The device also includes an electron transferring layer between the luminescent layer and the second electrode (per claim 39), where the electron transferring material is Alq<sub>3</sub> (aluminum quinolate, per claims 40 and 41). Furthermore the hole transporting material may be mixed with the electroluminescent material in one layer in a ratio of 5-95% (per claim 47) (column 6, lines 29-33). Likewise the electron transport material can be mixed with the electroluminescent material in one layer in a ratio of 5-95% (per claim 48) (column 6, lines 47-51), and the device further includes a layer of copper phthalocyanine on the first electrode and lithium fluoride on the second (per claim 49)

The applied reference has a common inventor with the instant application.

Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art

under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

***Claim Rejections - 35 USC § 103***

27. Claims 47-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pillow et al. (WO 2002/20692).

28. Concerning claims 47 and 48, Pillow et al. describe the electroluminescent devices discussed above, and further disclose that the electron transmitting material includes oxadiazoles (page 8, line 14) and that the layer with the luminescent compound may consist of the compound alone, or doped into a host forming a blend. (page 8, lines 19-20) Such hosts include oxadiazoles (electron transporting material, page 8, lines 24-25), per claim 48 or CBP (hole transferring material) (per claim 47). Given the teaching that the light emitting material can be mixed with other materials, it would have been obvious to one of ordinary skill in the art to adjust the relative concentration of the material to optimize the performance of the device, including proportions between 5 and 95%.

29. Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pillow et al. (WO 2002/20692) as applied to claim 48 above, and further in view of Van Slyke et al. (Applied Physics Letters, vol. 69, no. 15, pp. 2160-2162).

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30. Concerning claim 48, Pillow et al. describe the organic light emitting device discussed above, and further disclose the use of a layer of LiF adjacent to the second electrode. Pillow et al. are silent on the use of CuPc (copper phthalocyanine) on the first electrode.

31. Van Slyke et al. describe organic electroluminescent devices utilizing CuPc on the first electrode. The use of the CuPc layer lowers the interfacial barrier and improves hole injection, and has an improved adhesion to the ITO surface. (See page 2162)

32. Given this teaching, it would have been obvious to one of ordinary skill in the art to use a layer of CuPc adjacent to the ITO electrode for the purpose of lowering the interfacial barrier, improving hole injection and layer adhesion to the ITO surface.

33. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pillow et al. (WO 2002/20692) as applied to claim 29 above, and further in view of Sano et al. (5,456,988) and Akama et al., Vol. 44, pp. 1101-1112 (1995).

34. Concerning claim 30, Pillow et al. describe organic electroluminescent devices comprising metal pyrazolone complexes. Pillow et al. are silent on the use of non Lanthanide metals.

35. However, other metals are known to be active in electroluminescent devices, and complexes of other metals can be used interchangeable with complexes of terbium and other lanthanide metals. Sano et al. describe organic electroluminescent devices where the light emitting material is a metal complex of a derivative of 8-hydroxyquinoline.

Metals suitable for the materials include terbium, aluminum, gallium and indium.  
(column 3, lines 33-38).

36. Akama et al. describes pyrazolone complexes of aluminum, gallium and indium. Given this teaching, and the fact that metal complexes containing those metals are predicted to behave in the same way as analogous terbium complexes, it would have been obvious to use the materials described by Akama et al. as light emitting materials in an electroluminescent device as described by Pillow et al., since they would be predicted to function in the same manner, as light emitting materials.

37. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gao et al. (Synthetic Metals, vol. 99, no. 2, pp 127-132, 1999) as applied to claim 31 above, and further in view of Sano et al. (5,456,988) and Marchetti (Main Group Metal Chemistry, vol. 24, no. 5, pp. 257-266, 2001).

38. Concerning claim 32, Gao et al. describe organic electroluminescent devices comprising metal pyrazolone complexes coordinated to neutral ligands. Gao et al. are silent on the use of other metals than terbium in the metal complexes.

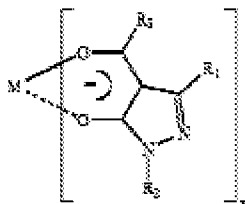
39. However, other metals are known to be active in electroluminescent devices, and complexes of other metals can be used interchangeable with complexes of terbium and other lanthanide metals. Sano et al. describe organic electroluminescent devices where the light emitting material is a metal complex of a derivative of 8-hydroxyquinoline. Metals suitable for the materials include terbium, zinc and cadmium. (column 3, lines 33-38).

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40. Marchetti describes metal complexes containing zinc and cadmium, comprising the same coordinating ligands as Gao et al. Given the similarity in structure, and the fact that the metals such as terbium, zinc, and cadmium are predicted to function equivalently in light emitting devices, it would have been obvious to one of ordinary skill in the art to use the cadmium and zinc complexes described by Marchetti in an electroluminescent device as described by Gao et al., since they would be predicted to function in the same way, as electroluminescent materials.

### ***Double Patenting***

41. Claims 29-30, 34-36, 39-41, 47-49 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 4-5, 7-9, 12, 14-15 of U.S. Patent No. 7,211,334. Although the conflicting claims are not identical, they are not patentably distinct from each other because Patent No. 7,211,334 claims organic electroluminescent devices comprising a layer of luminescent material positioned between a first and second electrode, where the material has the structure shown below and the metal is rubidium, magnesium, calcium, gallium, indium, germanium, tin, antimony, lead, manganese, iron, ruthenium, osmium, cobalt, rhodium, iridium, nickel, palladium, platinum, cadmium or chromium.



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42. The device further includes a layer of hole transmitting material between the first electrode and electroluminescent layer (claim 4), where the material is an aromatic amine or polymer (claim 7). Also, an electron transmitting layer between the electroluminescent layer and the second electrode (claim 5), where the electron transmitting layer is a metal quinolate, specifically aluminum, or lithium quinolate (claims 8-9), where the hole transferring or electron transferring material can be mixed with the light emitting material in a single layer (claims 14-15), and where copper phthalocyanine and lithium fluoride are used on the first and second electrode respectively (claim 12).

43. Given the overlap in structure of the electroluminescent material between the present claims and the patented claims, and the detail of the patented claims, one of ordinary skill in the art would clearly arrive at the present invention.

Claims 29-30, 34-36, 39-41, 47-49 directed to an invention not patentably distinct from claim 1, 4-5, 7-9, 12, 14-15 of commonly assigned U.S. Patent No. 7,211,334 See discussion above.

The U.S. Patent and Trademark Office normally will not institute an interference between applications or a patent and an application of common ownership (see MPEP Chapter 2300). Commonly assigned U.S. Patent No. 7,211,334, discussed above, would form the basis for a rejection of the noted claims under 35 U.S.C. 103(a) if the commonly assigned case qualifies as prior art under 35 U.S.C. 102(e), (f) or (g) and the conflicting inventions were not commonly owned at the time the invention in this application was made. In order for the examiner to resolve this issue, the assignee can, under 35 U.S.C. 103(c) and 37 CFR 1.78(c), either show that the conflicting inventions



were commonly owned at the time the invention in this application was made, or name the prior inventor of the conflicting subject matter.

A showing that the inventions were commonly owned at the time the invention in this application was made will preclude a rejection under 35 U.S.C. 103(a) based upon the commonly assigned case as a reference under 35 U.S.C. 102(f) or (g), or 35 U.S.C. 102(e) for applications pending on or after December 10, 2004.

44. Claims 29-30, 34-36, 39-41, 47-49 are rejected under 35 U.S.C. 103(a) as being obvious over U.S. Patent No. 7,211,334.

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(I)(1) and § 706.02(I)(2).

See Discussion Above.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL E. NELSON whose telephone number is (571)270-3453. The examiner can normally be reached on M-F 7:30am-5:00pm EST (First Friday Off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Callie Shosho can be reached on 571-272-1123. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Michael E. Nelson  
Examiner  
Art Unit 1794

/Callie E. Shosho/  
Supervisory Patent Examiner, Art Unit 1794

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